



McGlynn Laboratories, Inc.

Special Report

Lake Munson and Woodridge algae Blooms

By Sean E. McGlynn
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Funded by

The Leon County Board of County Commissioners

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Samples collected on 9-10-05 in Lake Munson contained very dense growth of cyanobacterial colonies of *Microcystis aeruginosa* Kuetzing. Dr. Prasad, who is on the Board of Directors of the International Phycological Society, tells me that *Microcystis aeruginosa*, along with two other species of the genus, *M. viridis* (A. Br.) Lemmermann and *M. wesenbergii* (Komarek) Starmach, are known to produce several hepatotoxic peptides, called microcystins, which can cause liver damage as well as having tumor promoting activity. However, poisoning usually does not occur unless there is a heavy water bloom that forms a dense surface scum. Factors contributing to such heavy waterblooms are the introduction of nutrient rich eutrophic or hypereutrophic water during warm, sunny weather.

Most algal toxins are merely irritating to humans during short-term incidental contact. Red Tide commonly causes respiratory irritation. *Lyngbya*, the filamentous cyanobacteria that has begun to appear in Wakulla Springs has toxins that cause poison ivy like lesions in humans after direct contact with the skin. A friend of mine had a very bad case, but she is fine now. There has never been a documented death from an algal bloom in Florida. That's why I don't think this merits a health advisory (it also has no bearing on fish consumption). Some public education concerning these blooms might be beneficial because such blooms could potentially occur in many places due to the high pollutant load flowing into all area Lakes from City of Tallahassee stormwater runoff.

This bloom was probably caused by the disappearance of the hydrilla and other submerged macrophytes in Lake Munson, which were absorbing nutrients from the stormwater. Exotic apple snails in the lake and possibly an herbicide treatment have left the lake without submerged plants. The plants in the lake have been receiving nourishment from the nutrient laden stormwater runoff that flows into Lake Munson from the City of Tallahassee. There seem to be some sewage leaks into portions of the drainage basin, particularly in the part within the box culvert that flows under FSU. Now that the submersed plants are gone, bluegreen algae or cyanobacteria are proliferating in its place.

Woodbridge Pond

The recent problems observed in a pond near Lake Jackson, bounded by Woodbridge, Kensington and Camden Roads were not due to algae. The water in the pond was filled with a high abundance of bacterial filaments rather than any algae. The bloom had a slight purple tinge. There was no sign of algal growth in the lake sample, but an abundance of bacterial filaments (less than one micrometer in diameter). This is rather unusual for our area. This appears to be due to a bloom purple sulfur bacteria.

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Lake Munson has currently has a significant lake wide algae bloom. Since 1998 there have been two algal blooms of a similar magnitude. This bloom was sampled and found consist of a bluegreen algae or cyanobacteria called *Microcystis*. This is a potentially harmful algal bloom (HAB). I sent a 1 liter water sample to Green Water Labs in Palatka, FL. The sample tested positive for the algal toxin microcystin at 50 to 60 times the threshold for drinking water. There are no threshold levels for recreational waters. A notice, or warning similar to the attached notice from the Florida Department of Health is recommended. The fish kill reported on 10/10/05 was not directly related to the algal bloom. The current dry conditions isolated a pool of fish causing a die off from a lack of dissolved oxygen.

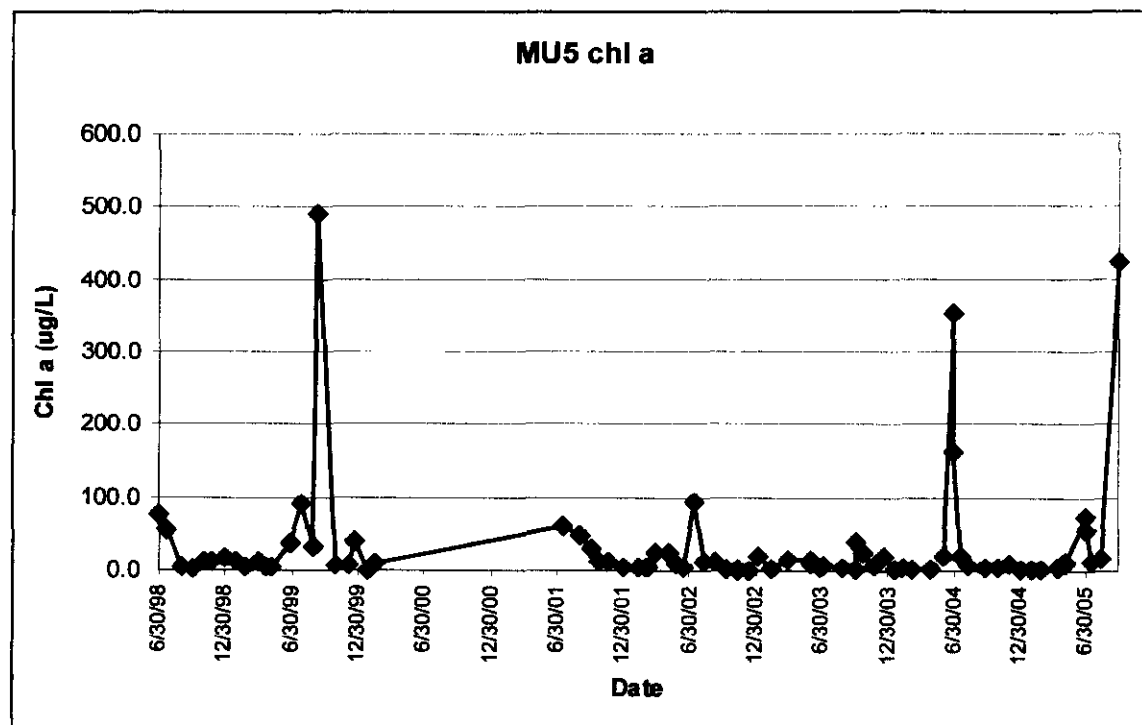


Figure 1: chlorophyll levels in Lake Munson (chlorophyll a, in ug/L)

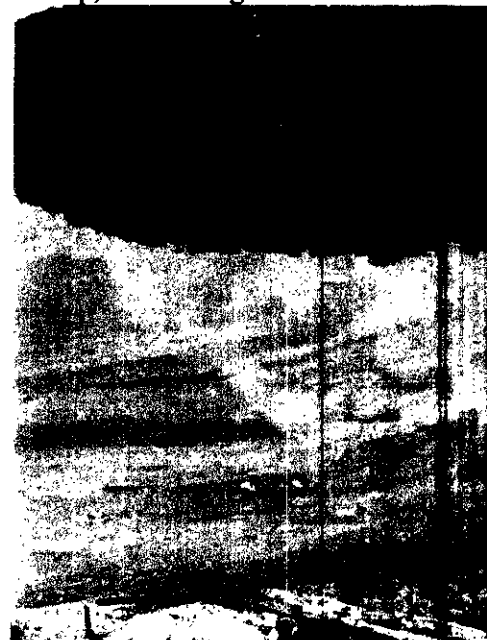
We have not seen any *Microcystis* in any lakes since before the drought in 1999. In September 2004 we performed a complete microalgal survey of all Leon County Lakes. No *Microcystis* was found anywhere (recent algal blooms in Piney Z and the Central Drainage Ditch at Gamble Street were a different species of cyanobacteria). The water flowing into Lake Munson from the City of Tallahassee is not sufficiently clean to support anything other than a hypereutrophic waterbody.

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Figures 2, 3, and 4: Lake Munson at the new boat ramp, 9/10/05 algae bloom.



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Figure 5: Fish kill at the dam on Lake Munson, 10/10 05.

Purple sulfur bacteria are a group of Proteobacteria capable of photosynthesis. They are common in sulfur springs or stagnant water. Unlike plants and algae, they do not use water as their reducing agent, and so do not produce oxygen. Instead they use hydrogen sulfide, which is oxidized to produce granules of elemental sulfur. They are a group of versatile organisms that can switch from one mode to another depending on conditions (photoheterotrophs, photoautotrophs or chemoheterotrophs). When it comes to waste lagoons, the color purple is desirable and easy on the nose. Purple-colored wastewater lagoons have fewer odors than conventional grayish lagoons because the purple sulfur bacteria feed on ammonia and hydrogen sulfide, organic compounds that cause odor. Purple sulfur bacteria are considered desirable in these ponds.

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Have you been "slimed"?

Contact with blue-green algae can make you sick.

When blue-green algae (cyanobacteria) form "blooms" in lakes, ponds or rivers, these organisms can release toxins which can make people and animals sick. These large mats of algae can form underwater, rising to the surface overnight, and they sometimes have a bad smell. These "blue-green" algae also can be brown or red in color and can sometimes look like thick paint spilled in the water.

Swimming in water with a toxic blue-green algae bloom can cause:

- skin rash
- runny nose
- irritated eyes

Swallowing such water can:

- cause vomiting or diarrhea
- affect your liver
- poison pets

If you accidentally come in contact with a blue-green algae bloom, wash thoroughly, paying special attention to the swimsuit.

If you think you may have been exposed to a harmful blue-green algae bloom, contact your doctor immediately for medical attention.

This poster was developed by the Florida Harmful Algal Bloom Task Force in cooperation with the Florida Fish and Wildlife Conservation Commission.

For more information about blue-green algae, visit the Florida Marine Research Institute at www.floridamarine.org

Microcystin Analysis Report**Project: McGlynn Laboratory**Sample IdentificationSample Collection Date

Microcystis Bloom from Lake Munson

09/23/05

Sample Prep – The sample was sonicated, filtered, and diluted prior to analysis. The sample was run in duplicate along with a 1.0 µg/L MCLR standard.

Analytical Methodology – A microcystins enzyme linked immunosorbent assay (ELISA) was utilized for the quantitative and sensitive congener-independent detection of MCs. The current ELISA kit is sensitive to all MCs (LR, LA, RR, YR, etc.) down to a detection/quantification limit of 0.15 µg/L. A MCLR standard recovery averaged 104%. An appropriate correction factor was utilized for the final concentration determination.

Interpretation - the 1.0 µg/L MCLR standard represents the drinking water threshold level, this bloom is approximately 55 times the acceptable level for drinking water. There are no recreational threshold levels at the current time.

Results Summary

<u>Sample</u>	<u>Date of Collection</u>	<u>MC lev els</u> (µg/L)
Microcystis Bloom	09/23/05	≈ 54.4

Cyan
LAB

Dr. A. K. S. K. Prasad

11-24-2004

**MICROALGAE OF LEON COUNTY LAKES:
SPECIES COMPOSITION AND ABUNDANCE IN SEPTEMBER 2004 COLLECTIONS**

The microalgae in thirteen lake sites in Leon County were examined, using concentrated surface water samples, preserved in Lugol's solution. Three aliquots of 0.05 ml each were examined in Nikon Labophot microscope, fitted with phase contrast optics at 400X magnification. All cells were counted in each aliquot and total number of algal cells were calculated and expressed as cells per liter.

Microalgae: absolute abundance

Barring a few stations, by and large, the microalgae abundance is low in terms of cell densities. Only four stations, **BOB, LW1, McBride Landing and TOB**, showed abundance of 1.5×10^6 cells per liter (see Fig. 1). Of these four stations, the highest abundance of cells was seen in **TOB**, with 2.15×10^6 cells per liter, followed by McBride Landing, BOB and LW1 (see table 1). The remaining seven stations (BOC, CA1, HOG, Iamonia, JO3, J16, Miccosukee, Munsen and TOC) all recorded a very low abundance, less than 0.5×10^6 cells per liter of water sample.

Microalgae: dominant algal groups

In TOB site, the high abundance was due to, predominance of diatoms (Bacillariophyceae), accounting for 50.88% of the cells, followed by green algae with 37.7%.. Blue green algae and Cryptophytes were also present but in very low numbers (see table 2). Diatoms were represented by *Fragilaria* sp. and *Aulacoseira granulata* (Ehrenb.) Ralfs and *Nitzschia fruticosa* Hustedt. Green algae were mainly from the colonial genus *Sphaerocystis* spp. *Pseudanabaena* spp and *Merismopedia* spp of blue-green algae were also present. In site BOB, over 95% of microalgae was represented by green algae (Chlorophyceae), belonging to *Sphaerocystis* spp and *Botryococcus braunii* Kuetzing. In station LW1, green algae were predominant with over 80% of the cells counted, and were represented by *Sphaerocystis* spp. In station McBride landing site, green algae were predominant with 94 % of cells, with *Botryococcus braunii* as the most dominant species. Note that the counting units in *Botryococcus* is a colony, where cells are difficult to separate (actual number of cells would be much higher than estimated here!)

Detailed list of species with their cell abundances and relative % abundances for thirteen stations are given in the tables attached, herewith. A note worthy feature in Miccosukee station is the presence of a dominant freshwater dinoflagellate, possibly of *Peridinium* affinity. The final determination requires detailed and careful examination of cells using electron microscopy. Similar dinoflagellate was also encountered in TOC station.

Based on the species (see cumulative species list for all stations-tables) observed here, no known toxic or harmful phytoplankton species is observed in the lake samples in this study.